

WHAT IS CLAIMED IS:

1. A machine for manufacturing a fibrous web from a fibrous suspension, said machine having a running direction and a sheet forming area, said machine comprising:

at least one suction box, each said suction box including a main box having at least one connection associated therewith configured for connection with at least one vacuum source, each 5 said connection including a line;

at least one porous fabric motivating the fibrous web through the sheet forming area in close proximity to at least one said suction box, said porous fabric having two edge zones, each said edge zone being parallel to said running direction and located on an outer edge of said porous fabric;

10 at least one suction box covering connected to each said suction box, each said suction box covering including at least two drainage elements disposed laterally to said running direction, said at least two drainage elements border a suction slit, each said drainage element including a drainage element main body, at least one drainage element ceramic and at least one drainage element adhesive point joining said drainage element main body and said at least one 15 drainage element ceramic:

a format slide located in each said edge zone of each said suction slit including a format slide main body, at least one format slide ceramic and at least one format slide adhesive point if joining said format main body to said at least one format slide ceramic,

at least one removable edge piece connected to at least one of said format slide and said

20 at least one drainage element; and

at least one temperature sensor connected to said at least one edge piece.

2. The machine of claim 1, wherein said at least one temperature sensor measures a temperature of at least one of said drainage element main body, said drainage element ceramic, said drainage element adhesive point, said format slide main body, said format slide ceramic, and said format slide adhesive point.
3. The machine of claim 1, wherein a sheet forming area is defined by the area of said at least one suction box overlayed by the fiber suspension.
4. The machine of claim 1, wherein said at least one porous fabric is a mesh screen.
5. The machine of claim 1, wherein said at least two drainage elements are drainage rails.
6. The machine of claim 1, wherein said at least one temperature sensor is located in said at least one drainage element ceramic proximate to a surface of said at least one drainage element ceramic, said surface of said at least one drainage element ceramic indicating an approximate maximum temperature.
7. The machine of claim 1, wherein said at least one temperature sensor is located in said at least one format slide ceramic proximate to a surface of said at least one format slide ceramic, said surface indicating an approximate maximum temperature.
8. The machine of claim 1, wherein said at least one temperature sensor is located above a section of the width of said at least one drainage element that is wetted with said at least one porous fabric.
9. The machine of claim 1, wherein said at least one temperature sensor is located in a recess of at least one of said at least one drainage element ceramic and said at least one format slide ceramic.

10. The machine of claim 1, wherein said at least one temperature sensor is located in at least one of beginning and end of said at least one drainage element as viewed from the running direction.

11. The machine of claim 1, wherein said at least one temperature sensor comprises a plurality of temperature sensors positioned at a periodic distance to each other as viewed in a direction lateral to said running direction.

12. The machine of claim 11, wherein said periodic distance is approximately 500 mm.

13. The machine of claim 1, wherein each said temperature sensor is a thermocouple.

14. The machine of claim 1, wherein at least one of said drainage element main body and said format slide main body is comprised of a glass fiber reinforced plastic.

15. The machine of claim 1, wherein at least one of said at least one drainage element ceramic and said at least one format slide ceramic is a small ceramic plate with a height of between approximately 1 mm and 10 mm.

16. The machine of claim 15, wherein said height is between approximately 2 mm and 6 mm.

17. The machine of claim 1, wherein said format slide is positionable laterally to said running direction.

18. The machine of claim 1, wherein said format slide is of unitary construction with a constant height.

19. The machine of claim 18, wherein said format slide further includes a height adjustment mechanism.

20. The machine of claim 19, wherein said height adjustment mechanism includes at least one adjustment screw and at least one locking screw.

21. The machine of claim 1, wherein said format slide is of multi-piece construction with a constant height.

22. The machine of claim 21, wherein said format slide further includes a height adjustment mechanism.

23. The machine of claim 21, wherein said height adjustment mechanism further includes at least one adjustment screw and at least one locking screw.

24. The machine of claim 1, wherein said format slide includes an extension extending toward said sheet forming area.

25. The machine of claim 24, wherein said extension contacts said porous fabric.

26. The machine of claim 24, wherein said format slide is fluid permeable.

27. The machine of claim 24, wherein said format slide surface in contact with said porous fabric has a profile approximately equivalent to a profile of said at least one drainage element surface in contact with said porous fabric.

28. The machine of claim 24, wherein said extension is wedge-shaped.

29. The machine of claim 24, wherein said extension is perforated.

30. A method for monitoring a drainage element in a paper machine with a running direction, the drainage element including at least one drainage element ceramic, comprising the steps of:

5 measuring a temperature in at least one of the at least one drainage element ceramic, at least one drainage element adhesive point and a drainage element main body;

analyzing said temperature in a process control system;

comparing said temperature to at least one threshold value; and

dependent upon said analyzing step, using said process control system for at least one of:

activating at least one control element to indicate said temperature has exceeded
10 said threshold value; and

initiating a countermeasure of one of discontinuing heating and commencing
cooling in at least one of said at least one drainage element ceramic and at least one drainage
element adhesive point and drainage element main body.

31. The method of claim 30, including the steps of performing signal conversion of said
temperature and performing data processing of said temperature following said measuring step.

32. The method of claim 30, wherein said temperature is measured in said at least one
drainage element ceramic on a surface of said at least one drainage element ceramic of maximum
temperature.

33. The method of claim 30, including the steps of creating a recess in said at least one
drainage element ceramic, inserting a temperature sensor into said recess and measuring said
temperature in said at least one drainage element ceramic with said temperature sensor.

34. The method of claim 33, including the step of sintering said at least one drainage
element ceramic after said creating step.

35. The method of claim 34, including the step of molding said at least one drainage
element ceramic, said creating step occurring during said molding step.

36. The method of claim 34, wherein said creating step is performed by working said
drainage element ceramic after said sintering step.

37. The method of claim 34, including the steps of at least one of reducing the speed of a
mesh screen, slowing a spray water flow rate, and reducing the vacuum on said drainage
element.

38. The method of claim 37, wherein said slowing step reduces said speed to
approximately 0.

39. The method of claim 37, including adjusting at least one spray tube thereby changing said spray water flow rate.

40. The method of claim 30, including changing a drive in said paper machine thereby changing a speed of said paper machine.

41. The method of claim 30, including adjusting at least one valve thereby reducing the vacuum on said drainage element.

42. The method of claim 30, including adjusting at least one tension roller thereby reducing a wire tension.

43. The method of claim 30, including signaling an alarm if said at least one threshold value is exceeded by said temperature.

44. The method of claim 43, wherein said at least one threshold value is between approximately 80^0 C and 120^0 C.

5 45. The method of claim 30, including signaling an alarm when said temperature has a rate of increase greater than 2^0 C per second.

46. The method of claim 30, including signaling an alarm if an initial said at least one threshold value is exceeded by said temperature and activating said initiating step if another said at least one threshold value is exceeded by said temperature.

10 47. The method of claim 46, wherein said initial at least one threshold value is between approximately 80^0 C and 120^0 C.

48. The method of claim 30, wherein said signaling occurs when said temperature has a rate of increase greater than 2^0 C per second.

15 49. The method of claim 30, including locating at least one temperature sensor in at least one of beginning and end of said at least one drainage element as viewed from said running direction.

50. The method of claim 30, including measuring said temperature at least two positions spaced at a periodic distance lateral to said running direction.

51. The method of claim 50, wherein said periodic distance is approximately 500 mm.

52. The method of claim 30, including using a thermocouple to measure said temperature.

53. The method of claim 30, wherein said drainage element is a ceramic rail.

54. A monitoring system for monitoring a drainage element in a paper machine comprising:

a drainage element ceramic connected to said drainage element, said drainage element including a drainage element main body and at least one drainage element adhesive point joining said drainage element main body and said drainage element ceramic;

5 at least one temperature sensor coupled to said drainage element ceramic;

a process control system electrically connected to said temperature sensor; and

at least one control element activated by said process control system analyzing an input from said temperature sensor.

55. The monitoring system of claim 54, wherein said at least one temperature sensor measures temperature of at least one of said drainage element main body, said drainage element ceramic, said drainage element adhesive point.

56. The monitoring system of claim 55, wherein said process control system compares said temperature to a threshold value by said process control system and, based on one of said analyzing and said comparing, automatically activates said at least one control element by said process control system to at least one of signal an alarm indicating said temperature is exceeding said threshold value, and initiates a countermeasure of one of discontinuing heating and

commencing cooling in at least one of said at least one drainage element ceramic and drainage element adhesive point and drainage element main body.

57. The monitoring system of claim 54, wherein said process control system converts and processes said temperature.

58. The monitoring system of claim 54, wherein said at least one temperature sensor is located in said at least one drainage element ceramic proximate to a surface of said at least one drainage element ceramic, said surface of said at least one drainage element ceramic indicating an approximate maximum temperature.

59. The monitoring system of claim 54, wherein said at least one temperature sensor is located in a recess of said at least one drainage element ceramic.

60. The monitoring system of claim 54, wherein said process control system compares said temperature to a threshold value and, based on said comparison, initiates a countermeasure of at least one of reducing the speed of a mesh screen, slows a spray water flow rate, and reduces the vacuum on said drainage element.

61. The monitoring system of claim 60, wherein said spray water flow rate is slowed to approximately 0.

62. The monitoring system of claim 61, including said countermeasure of exercising at least one spray tube thereby changing said spray water flow rate.

63. The monitoring system of claim 54, whereby said process control system changes a drive in the paper machine thereby changing a speed of the paper machine.

64. The monitoring system of claim 54, wherein said process control system adjusts at least one valve to reduce the vacuum on said drainage element.

65. The monitoring system of claim 54, wherein said process control system adjusts at least one tension roller in order to reduce a wire tension.

66. The monitoring system of claim 56, wherein said process control system signals an alarm if said at least one threshold value is exceeded by said temperature.

67. The monitoring system of claim 54, wherein said at least one temperature sensor is located in at least one of beginning and end of said drainage element as viewed from paper machine running direction.

68. The monitoring system of claim 54, wherein said at least one temperature sensor comprises a plurality of temperature sensors positioned at a periodic distance to each other as viewed in a direction lateral to the paper machine running direction.

69. The monitoring system of claim 68, wherein said periodic distance is approximately 500 mm.

70. The monitoring system of claim 54, wherein each said at least one temperature sensor is a thermocouple.

71. The monitoring system of claim 54, wherein said drainage element is a ceramic rail.